INTERLOCKING AND SECURABLE RETAINING WALL BLOCK AND SYSTEM

PRIORITY STATEMENT UNDER 35 U.S.C. § 119(E) & 37 C.F.R. § 1.78

This nonprovisional application claims priority based upon the prior U.S. provisional applications entitled "INTERLOCKING RETAINING WALL BLOCKS AND SYSTEM", Application Nos. 60/349,973, filed January 18, 2002, and 60/363,942, filed March 12, 2002, and the prior U.S. provisional applications entitled "SECURABLE RETAINING WALL BLOCK AND SYSTEM", Application Nos. 60/350,265 filed January 18, 2002 and 60/363,906 filed March 12, 2002, in the name of Larry Shaw.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to retaining walls, and more particularly disposed, but not by way of limitation, to retaining wall systems using interlocking retaining wall blocks that may incorporate stabilizing elements between the retaining wall blocks, and methods of their manufacture.

History of Related Art

Retaining walls having been used in general construction, and particularly in landscaping for many years. The design of and the materials used for retaining walls have varied over time. Retaining walls are typically used to support or retain soil or the like in place, but also may be used to enhance the appearance of a surrounding area. Such walls typically stand on a ground region and retain therebehind an earthen section or other fill material, which earthen section would otherwise form a natural slope in place of the retaining wall. Such retaining walls are typically vertical or at a slight angle. A generally vertical retaining wall may begin to deform as the mass of the earth retained behind it presses against it. A wall must resist this tendency. In addition, designers of retaining walls are constantly striving to construct retaining walls

providing greater strength for support of a greater weight.

One of the most popular, and aesthetically pleasing forms of retaining wall construction involves the use of manually positionable individual blocks. The blocks may be stacked one on top of the other to form a pattern on an outside face of the retaining wall. It can be very time consuming and tedious aligning numerous blocks to form the proper pattern in the retaining wall. Moreover, a retaining wall may have one or more curved portions. The very design of many retaining wall blocks to assist in maintaining stability may be counter to the formation of a curved wall portion. In addition, current retaining wall anchors are very cumbersome and laborious to install. These wall anchors include one end which is placed in a void of a retaining wall block. The block is then filled with concrete or a similar substance in order to secure the anchor attachment. The concrete must then dry or settle before the assembly of the retaining wall can continue. A block for retaining walls and a retaining wall system is needed which provides enhanced structural support for both curved and linear wall portions, and is simple to use as well as simple and inexpensive to manufacture.

Related art references discussing subject matter bearing some relation to matters discussed herein include U.S. Patent Number 5,941,042 to Dueck (Dueck), U.S. Patent Number Re. 37,278 to Forsberg (Forsberg), U.S. Patent Number 5,704,183 to Woolford (Woolford), U.S. Patent Number 4,964,761 to Rossi (Rossi), U.S. Patent Number 5,214,898 to Beretta (Beretta), U.S. Patent Number 5,294,216 to Sievert (Sievert), U.S. Patent Number 5,711,130 to Shatley (Shatley), U.S. Patent Number 5,484,236 to Gravier (Gravier), German Gebrauchsmuster DE 295 00 694 U1 to Ming Su (Ming Su), U.S. Patent Number 5,865,006 to Dawson (Dawson), U.S. Design Patent Number 380,560 to Forsberg, U.S. Design Patent Number 384,168 to Stevenson, U.S. Design Patent Number 397,451 to Stevenson, U.S. Patent Number 5,540,525 to Miller (Miller), U.S. Patent Number 5,800,097 to Martin (Martin), U.S. Patent Number 5,487,623 to Anderson et al (Anderson), U.S. Patent Number 5,881,511 to Keller, Jr. (Keller), U.S. Patent Number 5,524,551 to Scheiwiller (Scheiwiller), U.S. Patent Number 6,260,320 B1 to Di Lorenzo (Di Lorenzo), U.S.

Patent Number 5,226,275 to Trahan (Trahan), U.S. Patent Number 4,824,293 to Brown et al. (Brown), U.S. Patent Number 5,522,682 to Egan (Egan), and U.S. Patent Number 6,176,059 B1 to Cantarano et al (Cantarano). Dueck discloses a retaining wall block with downward-extending cylindrical knobs. Forsberg discloses pins and pockets for interlocking overlapping blocks. Woolford discloses a masonry block which has a centrally-located and dogbone-shaped, or two centrally-located circular, protrusions aligned with an opposing inset (or insets) extending partially into the block. Rossi discloses dry-mounted construction elements for use in a retaining wall with a series of openings within each block. Beretta discloses retaining wall blocks with a cambered front, tapering side walls and an abutment for engagement with an adjacent lower block. Sievert discloses a solid composite masonry retaining wall block with a flange extending down from the block back surface past the height of the block. Shatley discloses a retaining wall building block with rearward and forward aligning elements extending downward, holes extend through the blocks and pins for interlocking them together. Gravier discloses retaining wall blocks with an upward lateral extending front lip and a laterally extending recess. Ming Su apparently discloses a retaining wall block with upward-extending cylindrical knobs. Dawson discloses a retaining wall block with a flange extending downward from the block's rear surface. The Forsberg design patent discloses a three faceted broken front face retaining wall block with a rear edge protrusion from the bottom surface of the block. The 384,168 Stevenson design patent discloses a retaining wall block with 2 rear protrusions from the bottom surface of the block. The 397,451 Stevenson design patent discloses a portion of a retaining block wall using the retaining wall blocks of the 384,168 design patent. Miller discloses a groove in the side of a block and uses a small slat inserted in the groove. Martin discloses an array of projections on the top face of a block that fits into an array of apertures on a bottom face of a higher block. Anderson discloses vertical rods inserted through holes of the blocks in order to form reinforced columns. Keller discloses block having a dovetail section for fitting together with adjacent blocks. The Scheiwiller discloses blocks having holes for attaching with other blocks by filling the holes with

concrete. Di Lorenzo discloses wall flanges held together by rods or cables that are held in each adjacent brick. Trahan discloses a block with a lower lip that fits into the block below it. Brown discloses a wall using a tieback to connect to a lower member. Egan discloses a modular wall block with rearward abscesses for receiving grid connectors. Cantarano discloses a wall form panel with interlocking protrusions around the edges which make the panel reversibly symmetric.

It would be a distinct advantage to have a block which is simple to make and to use in building retaining walls, and which provides greater support, while maintaining the aesthetic beauty of the segmental block pattern.

SUMMARY OF THE INVENTION

The present invention relates to retaining walls, and more particularly, one aspect of the present invention involves a retaining wall block system incorporating a mounting surface for receiving a stabilizing element and may further include an interlocking mechanism. The retaining wall blocks may be secured by placing a stabilizing element on the mounting surface of two or more adjacent blocks, thereby providing additional support and sturdiness the a retaining wall block system. An entire row, or large portions thereof, can be provided significant stabilization from one or a series of stabilizing elements. The mounting surface receives a stabilizing element without disturbing the assembly of the blocks into the retaining wall system.

In another embodiment, the block may include a block body having opposing front and back body portions, and two opposing side body portions which define a void in the interior of the block. The block may also include at least one aligning element located on an upper surface of the block body, on the side body portions, adjacent to the void. The aligning elements may be integral with the respective side body portion from which it extends, and may extend across the width thereof. The aligning elements are separated laterally from each other. The aligning elements may also extend rearwardly of a line defined by the rear surface defining the void, thereby forming a generally L-shaped element having a rear section extending across a portion of the

width of the rear body portion also adjacent to the void. When assembling the blocks on top of each other, the blocks are staggered, so that each block in an upper row rests upon parts of two blocks in a lower row. The void in the upper block is placed over an aligning element of each of the two lower blocks. Configuration of the aligning elements and void size permits use in both straight and curved retaining wall sections without necessitating removal of any parts of the aligning elements.

BRIEF DESCRIPTION OF DRAWINGS

A more complete understanding of the method and apparatus of the present will become more apparent by reference to the following drawings, in conjunction with the accompanying Detailed Description.

FIG. 1A is a top plan view of a first embodiment of an interlocking block constructed in accordance with the principles of a first embodiment of the present invention;

FIG. 1B is a side elevational view illustrating the block in FIG. 1A;

FIG. 2 is a top plan view illustrating two of the interlocking blocks of FIGS. 1A and 1B coupled together by a stabilizing element and secured in place by an anchoring element constructed in accordance with the principles of the present invention;

FIG. 3 is a side elevational cross sectional view of a portion of a straight retaining wall and depicting the placement of the stabilizing element of FIG. 2;

FIG. 4 is a perspective view illustrating several rows of a straight retaining wall using one embodiment of the interlocking blocks of the present invention, and depicting the stabilizing element, staggered blocks, and a mesh section;

FIG. 5 is a top plan view of a portion of a curved retaining wall constructed in accordance with the present invention utilizing stabilizing elements therewith;

FIG. 6 is a perspective view illustrating a retaining wall system constructed in accordance with the principles of the present invention and incorporating one embodiment of the interlocking blocks of FIGS. 1A and 1B;

FIG. 7A is a top plan view illustrating a second embodiment of an interlocking

block according to the principles of the present invention;

FIG. 7B is a side elevational view illustrating the block in FIG. 7A;

FIG. 8 is a top plan view of a portion of a curved retaining wall incorporating the interlocking blocks of FIGS. 7A and 7B, stabilizing elements, and anchoring elements;

FIGS. 9A and 9B are top plan views further illustrating the interlocking blocks of FIGS. 7A and 7B;

FIG. 10A is a top plan view of an alternate embodiment of a retaining wall block constructed in accordance with the principles of the present invention; and

FIG. 10B is a side elevational view illustrating the block in FIG. 10A.

DETAILED DESCRIPTION

The present invention relates to a retaining wall system incorporating interlocking wall blocks, stabilizing elements, and anchoring elements forming that wall, and the method of manufacture of the wall blocks.

Referring now to FIGS. 1A, 1B and 2 in combination, interlocking retaining wall blocks 1 are used in construction of a retaining wall system 50, which rests upon the ground comprising a supporting surface therefore. Each of the blocks 1 are formed to support both the weight of the blocks 1 disposed above, and also to resist the force of fill material behind, and supported by, the retaining wall system 50. Commonly, concrete or brick is used to form a block 1. A block body 27 of the block 1 comprises a left body portion 20 and an opposing right body portion 21, which each join a front body portion 18 opposing a rear body portion 19. The left body portion 20 further includes a left interior surface 11, a left exterior surface 14, and upper and lower surfaces 2, 3. The upper surface 2 and lower surface 3 may be substantially flat. Similarly, the right body portion 21 has a right interior surface 12, right exterior surface 15, and upper and lower surfaces 2, 3. The width of the front body portion 18 may vary, depending on the construction of the block, and whether and how it is split during that construction. The front body portion 18 may have a "flat" front (not shown), or

may be "faceted." Each front body portion 18 has a forward interior surface 10, left and right facets 5, front facet 4, and upper and lower surfaces 2, 3. Rear body portion 19 has rear interior surface 9, left and right exterior surfaces 14, 15, and upper and lower surfaces 2, 3. In this embodiment, the rear body portion 19 and the left and right body portions 20, 21 are shown as substantially uniform in width, but could vary. The forward interior surface 10, rear interior surface 9 and left and right interior surfaces 11, 12 define a void 8 within the block 1. In one embodiment, the void 8 is substantially centered within the block 1, and is substantially trapezoidal, with the forward interior surface 10 forming the long side thereof.

Referring still to FIGS. 1A, 1B and 2 in combination, the block 1 also includes a left aligning element 29, formed on the left body portion 20 and a right aligning element 30, formed on the right body portion 21. The aligning elements 29, 30 extend upwardly from the block body 27 and are used for aligning one interlocking block 1 with another block 1 for forming the retaining wall system 50, and for causing the blocks 1 to interlock and strengthen the wall. The aligning elements 29, 30, extending upwardly (rather than down from the bottom surface 3 of the block body 27), are an advantage because this arrangement permits placing blocks 1 on a flat surface without requiring further actions to accommodate a downwardly extending aligning element. For instance, a concrete footing (not shown), may be used in place of the ground in FIG. 4. Without special design of the concrete footing, it would not accept a downwardly extending aligning element, unless the installation included the additional step of breaking off the downwardly extending aligning element, which takes some time. In addition, a block with a downwardly extending aligning element, if placed on the ground, might require excavating small holes for the aligning elements, or removing them, as above. This would also consume time. In this embodiment, the left and right sides of the aligning elements 29, 30 comprise, respectively, left exterior and interior surfaces 14, 11 and right interior and exterior surfaces 12, 15. The left aligning element 29 extends completely across the width of the left body portion 20; likewise, the right aligning element 30 extends completely across the width of the right body

portion 21, and both are adjacent to the void 8. This design creates fewer surfaces and corners, and is thus easier to produce. However, the aligning elements 29, 30 could also be inset slightly from the left and right interior and exterior surfaces 11, 12, 14 and 15. The aligning elements 29, 30 also each have a front face 16 and a rear face 17. The aligning elements 29, 30 have a substantial depth (from face 16 to 17) and extend forward from the rear face 17 a substantial portion of the length of the body portions 20, 21. In one embodiment, the aligning elements 29, 30 extend about one-half of the length of the body portions 20, 21, but do not extend as far forward as the forward interior surface 10. In this embodiment, the rear faces 17 of the aligning elements 29, 30 extend only to, and are flush with, the rear interior surface 9, and are forward of the rear exterior surface 7 of the block body 27. This permits a rear body portion 19 of an upper block 1 to rest upon the rear body portion 19. The full width of the left aligning element 29 (from the left exterior surface 14 to the left interior surface 11) and the right aligning element 30 (from the right exterior surface 15 to the right interior surface 12) and substantial depth provides a larger aligning element, and specifically a greater cross-sectional size, to support interlocking with the upper blocks 1 (as described below) without a mechanical failure of the aligning elements 29, 30. Either of the front faces 16 and/or rears face 17 may be substantially flat. A flat configuration of the rear faces 17 is an advantage by providing larger bearing surfaces against the force applied to it by upper blocks. A flat configuration of the front faces 16 is an advantage by helping retain mesh 22 as shown in FIG. 3. The rear faces 17 may be aligned to intersect the line formed by an edge between the rear interior surface 9 of the rear body portion 19 and the upper surface 2. This alignment of the rear faces 17 ensures that when another block 1 is placed on top, and aligned using the aligning elements 29, 30, it does not overhang in front of the lower block (see FIG. 4, described below). In this embodiment, the aligning elements 29, 30 do not extend rearwardly of the rear interior surface 9. The aligning elements 29, 30 can be integrally formed with the block body 27. This is advantageous, as the absence of a joint improves strength, and reduces cost and complexity of manufacture.

Referring specifically now to FIG. 2, a stabilizing element 51 is shown. In addition to the stabilizing force of the aligning elements 29, 30, a groove 49 (also seen in FIGs 1A and 1B) may be provided for receipt of stabilizing element 51 inset in the upper surface 2 of the block body 27. The groove 49 as herein shown, includes a front face 52, rear face 54, and bottom face 53. The groove 49 is preferably formed deep enough to retain the entire stabilizing element 51, but may also be deeper than the height of the stabilizing element 51. The stabilizing element 51, such as a length of rebar, rests in the groove 49, so that when the blocks 1 are stacked on top of each other, the upper surface 2 of the lower block, and the lower surface 3 of the upper block are flush against each other. The groove 49 may be implemented anywhere along the upper surface 2 of the block 1, however, for this particular embodiment, the grooves 49 are laterally located between the forward interior surface 10 and the aligning elements 29, 30. The stabilizing element 51 may be a length of rebar or other sturdy material placed between two blocks, or, alternatively, the stabilizing element 51 may run the entire length of, or a large portion of the retaining wall system 50. The stabilizing element 51 may also be used to trap or hold the mesh 22 in place as shown in FIG. 3.

A retaining wall system 50 may also need supplementary securement in addition to the aligning elements 29, 30, and the stabilizing element 51. In this case, an anchoring element 55 can be attached at one end to the stabilizing element 51, and the other end of the anchoring element 55 can be secured in the ground. These anchoring elements 55 can be placed throughout the retaining wall system 50. The anchoring elements 55 of the present invention are advantageous to previously used anchors due to the fact that the anchoring elements 55 can be immediately secured to the stabilizing element 51 without waiting for drying concrete, which secured the previous anchors.

Now referring to FIGs.3 and 4 in combination, FIG. 3 is a side elevational/section view depicting two stacked and interlocking blocks of FIG. 2 described above. As shown, the aligning element 30 of a lower block 1' fits into the void 8 of the upper block 1. The groove 49 is sufficiently deep so that the upper

surface 2 of the lower block 1' fits flush against the lower surface 3 of the upper block 1 wherein stabilizing element 51 runs therethrough. The stabilizing element 51 provides additional support for the retaining wall system 50 shown in partial detail as retaining wall 26 in FIG. 4. As further shown in FIG. 4, the stabilizing element 51 is placed in the groove 49. Another securing element shown in FIG. 3 is provided in mesh 22 which can be used in conjunction with the retaining wall system 50 of the present invention. The stabilizing element 51 may run the entire length of the row of the retaining wall 26, or may span just a few blocks 1 of the retaining wall 26. One or several stabilizing elements 51 can be used to enhance the sturdiness of the retaining wall 26. The stabilizing elements 51 may also hold the mesh 22 in place. One or more anchoring elements 55 as shown in FIG. 2 may also be integrated into the retaining wall 26 to increase sturdiness. Furthermore, mesh 22 may be interposed between upper and lower blocks 1, 1', and may be placed between each layer, or row, of blocks in the retaining wall 26. Mesh 22 is commonly used in retaining walls to provide additional support to the retaining wall, by transferring forces to the fill material. As shown in the perspective view of FIG. 4, the mesh 22 includes longitudinal wires 23 and cross-ties 24 joined at generally right angles and forming a welded wire gridwork panel. The mesh 22 may also comprise some other form of metal mesh (such as one having a mesh size smaller than the size of aligning elements on a block), or a geo-synthetic material, such as geogrid. A reinforcing material such as the mesh 22 aids in forming a mechanical interlock of the fill material in or through the relatively flat surface of mesh 22, transferring tension in mesh 22 to the fill material. A flat geo-synthetic sheet may also be used, which reinforces the wall in much the same way using friction between the sheet and the fill material. As shown in FIG. 4, a space among cross-ties 24 and wires 23 is placed over aligning elements 29, 30. Cross-ties 24 mechanically interlock with the front faces 16 of the aligning elements 29, 30 of the blocks 1 of the row, which transfers tension to the mesh 22 and provides better support for the retaining wall 26. Where the mesh size is too small to permit placing it over the aligning elements 29, 30, or where a sheet or geogrid is used, a large enough portion of the mesh 22 is placed

over the aligning elements 29, 30 to permit upper blocks 1 to be placed thereover. The mesh 22 may also be deformed to secure it over the aligning elements 29, 30 before placing upper blocks 1, or that step may cause the deformation. For low walls, or in other situations when reinforcement may be unnecessary, mesh 22 may also be omitted from the system. If so, lower surface 3 of upper block 1 will rest directly on upper surface 2 of lower block 1'. Aggregate, concrete or other reinforcing material, may also be placed within each void 8 of the blocks, again enhancing the overall strength of the retaining wall 26.

Again referring to FIG. 4, blocks 1, 1' may be aligned adjacently in a line (as shown in FIG. 2), or may be curved or angled (as shown in FIG. 5). Fill material, such as dirt or gravel (not shown), is placed behind the first row of blocks 1', preferably up to about upper surface 2. If mesh 22 is to be used, the mesh 22 is placed on top of the fill material, and secured above to the aligning elements 29, 30 of the first row of the blocks 1'. A second row of blocks 1 is placed on top of the first row, trapping the mesh 22 between the rows. Each block 1 of the upper row can be staggered laterally, aligning void 8 of the blocks of the upper row over right aligning element 30 of a left block 1' below and over left aligning element 29 of a right block 1' below, adjacent to the right block 1', and place rear face 17 of left and right aligning elements 29, 30 in contact with and flush with rear interior surface 9 of rear body portion 19 (as shown in FIG. 3A). If the retaining wall system 50 is angled or curved, only an edge of rear face 17 may be in contact with rear interior surface 9 (as shown in FIG. 5). These steps are repeated as necessary with further rows of blocks 1, mesh 22, and fill. Note, that this forms a vertically-aligned retaining wall system 50, in which the vertical faces of the rear body portions 19 of the blocks 1 lie substantially in a plane, and each row of blocks 1 is not stepped back with reference to blocks 1 below. Although the retaining wall system 50 as shown includes blocks 1 of the same type throughout the retaining wall system 50, other types of blocks 1 may be dispersed within the retaining wall system 50. For example, every third block may include a groove 49 and stabilizing element 51, whereas the remainder of the blocks 1 may include aligning elements 29,

30.

The top plan view of FIG. 5 depicts a curved or angled portion of such a wall. The curved portion in FIG. 5 differs primarily in that the left exterior surface 14 of the right block 1' is brought closer to the right exterior surface 15 of the left block 1'. Although the exterior surfaces 14, 15 are shown here as touching along their length, they may be left apart to provide a curve in retaining wall with the desired radius of curvature. Conversely, the exterior surfaces 14, 15 may be placed so that only the rear portions thereof are contacting, to provide a smaller-radius curve. The upper block 1 is set forward so that the rear interior surface 9 of the rear body portion 19 is in contact with the rear faces 17 of the aligning elements 29, 30 of the lower blocks 1'. Only an edge of the rear faces 17 at the corners of the aligning elements 29, 30 contacts the rear interior surface 9 of the upper block 1. In a curved portion of a retaining wall system 50, the grooves 49 come together at an angle. Therefore, for a curved wall, either the stabilizing element 51 can be shaped at a particular curvature in order to fit into the angled grooves 49, or the stabilizing element 51 may be omitted. Other block retaining wall systems include aligning elements on upper and lower blocks that permit alignment only if the blocks form a straight line. Similarly, such systems may include elements to secure placement of a reinforcing material, such as geogrid. If a curved wall is desired, it is often required to break off the aligning or securing elements, which is time-consuming. Blocks 1 with aligning elements 29, 30 permit alignment, and provide secure placement of mesh 22, in a curved wall, while reducing this disadvantage.

Referring now to FIG. 6, an alternative embodiment to the retaining wall of FIGS. 4 and 5 is illustrated. In this embodiment, the groove 49 and stabilizing element 51 are not included in the retaining wall system 50. The construction of the retaining wall system 50 is similar to that shown in FIGS. 4 and 5, excluding the placement of the stabilizing element 51 in the groove 49. In the embodiment shown in FIG. 6, a first row of blocks 1, 1' are arranged so that the left exterior surface 14 of the first block 1 makes contact with the right exterior surface 15 of the second block 1' thereby forming a curved portion of a retaining wall system 50. However, the embodiment described

in FIG. 6 is equally applicable to a straight retaining wall. A second row of blocks 1 may be stacked on top of the first row of blocks 1, 1' to form the retaining wall system 50. The blocks 1 of the second row of the retaining wall system 50 are staggered laterally so that the void 8 of the blocks 1 receives the aligning elements 29, 30 of the blocks 1, 1' of the first row. The void 8 of the block 1 of the second row is placed over the left aligning element 29 of the first block 1 and the right aligning element 30 of the second block 1'. The void 8 is large enough to accommodate at least one aligning element 29, 30 from each of the two adjacent blocks 1, 1' in the first row. The aligning elements 29, 30 ensure that the blocks of the second row are staggered one half unit laterally with respect to the first row of blocks. Staggering the blocks in adjacent rows provides additional stability when compared with a strictly vertical arrangement, particularly if a stabilizing element 51, aggregate, or another fill material is placed in the voids 8. The blocks 1 of the second row are also set forward so that its rear interior surface 9 of the rear body portion 19 is in contact with the rear faces 17 of the aligning elements 29, 30 of the blocks of the first row. This position allows the aligning elements 29, 30 to help blocks of the second row resist forces that fill material such as dirt will apply to the rear exterior surface 7 (and to a lesser extent, exterior surfaces 14, 15). The blocks 1 form a vertical retaining wall system 50 without the use of the groove 49 or the stabilizing element 51. This alternate embodiment is also pertinent to stepped retaining wall systems 50 utilizing the retaining wall blocks described below.

Now referring to FIGS. 7A and 7B, top plan FIG. 7A and elevation FIG. 7B depict an alternative interlocking block 31 of the present invention. The block 31 is constructed in a similar fashion as the block 1 of the first embodiment, and the same reference numerals are used to refer to items that do not differ. The upward orientation of these aligning elements is advantageous as described above. The block 31 differs in the configuration of the left and right aligning elements 34, 35, which are substantially L-shaped. The left aligning element 34 comprises a rear portion 42 and a forward portion 36. The forward portion 36 of the left aligning element 34 extends

upwardly from the left body portion 20, and the rear portion 42 upwardly from the left side of the rear body portion 19. Similarly, the right aligning element 35 comprises a rear portion 43 and a forward portion 37. The forward portion 37 of the right aligning element 35 extends upwardly from the right body portion 21, and the rear portion 43 upwardly from the right side of the rear body portion 19. In this embodiment, the left and right sides of the aligning elements 34, 35 comprise, respectively, left exterior and interior surfaces 14, 11 and right interior and exterior surfaces 12, 15. The forward portion 36 of the left aligning element 34 extends completely across the width of the left body portion 20; likewise, the forward portion 37 of the right aligning element 35 extends completely across the width of the right body portion 21, and both are adjacent to the void 8. This creates fewer surfaces and corners, and is easier to produce. However, as above, the aligning elements 34, 35 could also be inset slightly from surfaces 11, 12, 14 and 15. The forward portions 36, 37 of the aligning elements 34, 35 are similar to the aligning elements 29, 30 in FIGS. 1A, 1B, and may be integrally-formed with the rear portions 42, 43. The left rear portion 42 comprises a rear face 44 and a left side face 40. The right rear portion 43 also comprises a rear face 44 and a right side face 41. The rear faces 44, and side faces 40, 41, are rearward of a line extending along an edge formed at the void 8 by the rear interior surface 9 of the rear body portion 19 and by the upper surface 2. The rear faces 44 are forward of the rear exterior surface 7 of the block body 27. This is an advantage to structural strength of a wall formed of blocks 31, because a rear body portion 19 of an upper block 31 may rest upon that part of the rear body portion 19 of the lower block 31 rearward of the rear faces 44. The aligning elements 34, 35 have a substantial depth from faces 16 to 44 and extend forward from the rear faces 44, a substantial portion of the length of the body portions 20, 21. In one embodiment, the aligning elements 34, 35 extend somewhat more than one-half of the length of the body portions 20, 21, but do not extend as far forward as the forward interior surface 10. This depth includes the depth of both forward portions 36, 37 and rear portions 42, 43. The full width of the left aligning element 34 (from the left exterior surface 14 to the left interior surface 11) and

the right aligning element 35 (from right exterior surface 15 to right interior surface 12) and substantial depth (from faces 16 to 44) provides a larger aligning element, which is advantageous as described above. In particular, the aligning elements 34, 35 have a substantial depth in the direction resisting the forward force applied by interlocking blocks. Left and right rear portions 42, 43 extend laterally inwardly from, respectively the left and right exterior surfaces 14, 15, to, respectively, the side faces 40, 41. Although shown as contacting surfaces 14, 15, the rear portions 42, 43 could also be offset somewhat therefrom. In this embodiment, the rear portions 42, 43 extend inwardly of, respectively, the left and right interior surfaces 11, 12, creating an angled, or an L-shaped structure. This provides additional cross-sectional structure for the aligning elements 34, 35. The rear portions 42, 43 of the aligning elements 34, 35 do not contact one another, and do not extend over the whole lateral extent of the rear body portion 19.

As in the interlocking blocks of FIGs. 1A and 1B, a groove 49 for receiving a stabilizing element 51 is inset in the upper surface 2 of the block body 27. The groove 49 includes a front face 52, rear face 54, and bottom face 53. The stabilizing element 51 rests in the groove 49, so that when the blocks 31 are stacked on top of each other, the upper surface 2 of the lower block, and the lower surface 3 of the upper block are flush against each other. As noted with respect to the first embodiment, the groove 49 may be implemented anywhere along the upper surface 2 of the block 31 however, for this particular embodiment, the grooves 49 are laterally located between the forward interior surface 10 and the aligning elements 34, 35. The groove 49 should be deep enough to retain the entire stabilizing element 51, but may also be deeper than the height of the stabilizing element 51. The stabilizing element 51 may be placed between two blocks, or, alternatively, the stabilizing element 51 may run the entire length of, or a large portion of the retaining wall system 50.

Referring now to FIG. 8, this figure is a top plan view of a portion of a retaining wall 26 using the blocks described above and in FIGs. 7A, 7B. The aligning elements 34, 35 of the blocks 31 permit forming both straight and curved wall sections.

There must be a sufficient gap between a left side face 40 and right side face 41 to permit placing therebetween a right body portion 21 of a left block 31 of an upper row and a left body portion 20 of an adjacent left block 31 of an upper row, even when the lower row of blocks 31' is arranged in a line, or for a negative curvature radius (i.e. a curve whose center lies forward of the blocks) (not shown). The retaining wall 26 is constructed in a similar fashion as described in relation to FIGs 3, 4, and 5. The stabilizing elements 51, anchoring elements 55, and mesh 22 may be used as discussed above. As compared to a wall such as that shown in FIG. 4, a wall 26 formed by the blocks 31 will have successive rows of blocks 31 that will be stepped back, or battered, rather than vertical. This is because the aligning elements 34, 35 of the blocks 31 extend rearwardly of the rear interior surface 9, so stacked blocks form a vertical offset. This offset increases the overall stability and strength of a wall.

Referring again to FIGs. 7A, 7B and 8, the depth of the aligning elements 34, 35 between the rear face 44 and front faces 16 must be less than, and may be significantly less than, the distance between the rear and forward interior surfaces 9, 10. This permits two aligning elements 34, 35 of lower blocks 31 to be placed in an angled relationship in the void 8 to form a curved wall section as depicted in FIG. 8. The rear faces 44 may be substantially flat, which is advantageous as described above.

Referring now to FIGS. 9A and 9B, in another embodiment, the rear portions 42, 43 may extend no further laterally inward than, respectively, the left and right interior surfaces 11, 12. As shown in FIG. 9A, the left and right side faces 40, 41 may be aligned, respectively, with the interior surfaces 11, 12. Alternatively, as shown in FIG. 9B, the side faces 40, 41 may extend straight rearwardly. In yet other embodiments, all or part of the rear faces 44 and side faces 40, 41 may be replaced by a convex curved bearing surface, or the rear faces 44 may be angled with respect to the rear exterior surface 7, such as by it extending more forward inwardly.

As shown in FIGs. 10A and 10B, the block 1 may also be a solid retaining wall block 1 with a groove 49 inset on the upper surface 2. In this embodiment, the groove 49 includes a front face 52, bottom face 53, and rear face 54. The stabilizing element

(not shown) rests in the groove 49 without disrupting the level of the upper surface 2. The stabilizing element can be used to anchor one block 1, or, alternatively, can be used to anchor several blocks, or an entire row of blocks into place. Although the groove 49 depicted in FIGs. 10A and 10B is positioned roughly equidistant from the front facet 4 and the rear exterior surface 7, the groove 49 may be located anywhere between the front facet and rear exterior surface 4, 7. Additionally, though the groove 49 is shown as extending from the left and right exterior surfaces 14, 15, the groove 49 may be disposed at any angle. Furthermore, the groove 49 may extend from the front facet 4 to the rear exterior surface 7.

It is thus believed that the operation and construction of the present invention will be apparent from the foregoing description. While the apparatus shown and described has been characterized as being preferred, it will be readily apparent that various changes and modifications could be made therein without departing from the scope of the invention as defined in the following claims.